



## **DOE FEMP First Thursday Seminar Learner Guide** **Energy Efficiency Expert Evaluations**

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### **Short Description**

This seminar will describe a step-by-step method to conduct an "energy efficiency expert evaluation" – a customized process to meet site-specific energy goals. This approach combines the most effective features of an energy audit and retro-commissioning, while avoiding the limitations of each.

Learn about a multi-disciplinary process to streamline site visit planning and on-site discovery, recommend corrective measures, establish a “master list of findings,” and complete the project handoff.

### **Core Competency Areas Addressed in the Training**

This course is designed to address the Federal Building Personnel Training Act of 2010 (FBPTA) competencies related to demonstrating familiarity with sustainability.

1. Manage an Energy Efficiency Expert Evaluation in a Federal facility to:
  - Improve energy efficiency
  - Monitor and evaluate the performance of critical building systems
  - Employ trouble-shooting techniques to identify efficiency opportunities on an equipment-wide and systems-wide basis
  - Identify low- and no-cost Energy Conservation Opportunities (ECOs) or Energy Conservation Measures (ECMs)
  - Provide justification for capital improvements by identifying ECOs/ECMs, including life cycle cost analyses
  - Increase occupant comfort and satisfaction by resolving issues

2. Employ a four-step multi-disciplinary process to uncover root causes of problems and develop practical solutions for facility energy and water efficiency improvements.

## Resources for Further Study

### **EERE Commissioning for Federal Facilities:**

[http://www1.eere.energy.gov/femp/pdfs/commissioning\\_fed\\_facilities.pdf](http://www1.eere.energy.gov/femp/pdfs/commissioning_fed_facilities.pdf)

### **FEMP Commissioning for Existing Buildings**

[https://www1.eere.energy.gov/femp/pdfs/OM\\_7.pdf](https://www1.eere.energy.gov/femp/pdfs/OM_7.pdf)

### **Whole Building Design Guide**

- Energy Analysis Tools: <http://www.wbdg.org/resources/energyanalysis.php>
- Commissioning: <http://www.wbdg.org/project/buildingcomm.php>

## Glossary

**Absolute Greenhouse Gas Emissions:** Total greenhouse gas emissions without normalization for activity levels (see Energy Intensity) but including any allowable consideration for sequestration.

**Acquisition Guidance and Efficiency Requirements (aka, Product Overview):** Define FEMP purchasing specifications.

**Advanced Metering:** A system that collects time differentiated energy usage from advanced meters via a network system on either an on-request or defined schedule basis. The system is capable of providing usage information on at least a daily basis and can support desired features and functionality related to energy-use management, procurement, and operations.

**Avoided cost:** The incremental cost to an electric power producer to generate or purchase a unit of electricity or capacity, or both, but which is instead provided by a third party or which is not needed due to energy conservation and efficiency.

**ASHRAE Level 1 Energy Audit:** An ASHRAE Level 1 Energy Audit, or Walk-Through Analysis, assesses a building's energy cost and efficiency by analyzing energy bills and conducting a brief on-site survey of the building(s). A Level 1 energy analysis will identify and provide a savings and cost analysis of low-cost/no-cost measures. It will also provide a listing of potential capital improvements that merit further consideration, and an initial judgment of potential costs and savings. RCx offers ASHRAE Level 1 Energy Audits. (ASHRAE)

**ASHRAE Level 2 Energy Audit:** An ASHRAE Level 2 Energy Audit, or Energy Survey and Analysis, is a more detailed building survey and energy analysis. In addition to a breakdown of the building's energy use, a Level 2 analysis also identifies and provides a savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria. It may also contain a list of potential capital-intensive improvements that would require thorough data collection, an engineering analysis, and a judgment of potential costs and savings. Lastly, a Level 2 Audit includes meeting with facility managers, owners, and operators to develop recommendations for changes to operation and maintenance procedures. This level of analysis is adequate for most buildings and measures. RCx offers ASHRAE Level 2 Energy Audits. (ASHRAE)

**ASHRAE Level 3 Energy Audit:** An ASHRAE Level 3 Energy Audit, or Detailed Analysis of Capital-Intensive Modifications, is an extension of a previously performed Level 2 analysis which focuses on the potential capital-intensive projects identified in the Level 2 audit and involves more detailed field data gathering as well as a more rigorous engineering analysis. It provides detailed project cost and savings calculations with a high level of confidence sufficient for major capital investment decisions.

**Basis of Design (BOD):** The documentation by the design team of the primary thought processes and assumptions behind design decisions that are made to meet the Owner's Project Requirements. The BOD describes the assumptions used for sizing and selection of systems (i.e. codes, standards, operating conditions, design conditions, weather data, interior environmental criteria, other pertinent design assumptions, etc.).

**Benchmark Energy Audit:** A Benchmark Energy Audit, or Preliminary Energy Use Analysis analyzes historic utility use and cost, which are used to develop the Energy Utilization Index (EUI) of the building. The building's EUI is then compared to similar buildings to quickly evaluate how energy efficient a building is

**Commissioning (Cx):** The National Conference on Building Commissioning has established an official definition of 'Total Building Commissioning' as follows: "Systematic process of assuring by verification and documentation, from the design stage to a minimum of one year after construction, that all facility systems perform interactively in accordance with the design documentation and intent, and in accordance with the owner's operational needs, including preparation of operation personnel"

**Commissioning Agent (CxA):** The qualified person, company or agency that plans, coordinates and oversees the entire commissioning process.

**Commissioning Plan:** The document prepared for each project that describes all aspects of the commissioning process including schedules, responsibilities, documentation requirements and communication structures.

**Emerging technologies (ET):** Contemporary advances and innovation in various fields of technology. Various converging technologies have emerged in the technological convergence of different systems evolving towards similar goals.

**Energy audit or assessment:** a survey that shows how much energy you use in your facility and help to identify energy efficiency measures.

**Energy Conservation Measure (ECM):** A building material or component whose use will affect the energy consumed for space heating, space cooling, domestic hot water or refrigeration.

**Energy conservation:** any behavior that results in the use of less energy. Turning the lights off when you leave the room or buying more energy efficient products are both ways of conserving energy.

**Energy efficiency:** the use of technology that requires less energy to perform the same function. A compact fluorescent light bulb that uses less energy than an incandescent bulb to produce the same amount of light is an example of energy efficiency. However, the decision to replace an incandescent light bulb with a compact fluorescent is an act of energy conservation.

**Energy intensity:** the relative extent that energy is required for a process.

**Energy management control system (EMCS):** The Energy Management Control System (EMCS) is a computer-based means for controlling and monitoring heating, ventilation, air-conditioning (HVAC), energy use, and lighting systems.

**Energy management:** the sum of measures planned and carried out to achieve the objective of using the minimum possible energy while the comfort levels (in offices or dwellings) and the production rates (in factories) are maintained. To make an efficient use of the energy and, as a consequence, to save it, the actions are focused on: energy conservation, energy recovery, and energy substitution.

**ENERGY STAR®:** A United States government program jointly managed by the US Environmental Protection Agency and the Department of Energy in an attempt to reduce energy consumption and greenhouse gas emission by power plants. What began originally as a voluntary labeling program has grown in to one of the largest efforts worldwide to promote energy efficient consumer products.

**Energy Use Intensity:** Energy consumption per square foot of building space, including industrial or laboratory facilities. The relative extent that energy is required for a process.

**FEMP Designated Product Categories (aka Covered Product Categories) - FEMP-** Designated product categories define energy efficiency requirements that are in the upper 25% of their class in energy efficiency. FEMP-Designated products are not specific products. FEMP does not purchase, recognize, endorse, or otherwise identify specific products for

Federal procurement. Instead, FEMP identifies required energy efficiency performance requirements for a category of products, which is typically an energy consumption level within the upper 25% of the product category.

### **FEMP Product Energy Efficiency Requirements (aka, Efficiency Requirements)**

**Functional Tests:** Tests that evaluate the dynamic function and operation of equipment and systems using direct observation or other monitoring methods. Functional testing is the assessment of the system's (rather than just component's) ability to perform within the parameters set up within the design intent.

**Indoor Environmental Quality (IEQ):** The artificial environment that exists in a building that includes the factors of thermal comfort, illumination, noise, ventilation and level of indoor air pollutants.

**Issues Log:** A formal and ongoing record of problems or concerns, as well as associated priorities, implications and resolutions.

**Owner's Project Requirements:** The documentation that provides the Owner's vision for the planned facility, functional performance requirements and expectations for how it will be used and operated. It also provides benchmarks and criteria for performance.

**Re-commissioning:** is another type of commissioning that occurs when a building that has already been commissioned undergoes another commissioning process. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meets defined objectives and criteria. Commissioning is an all-inclusive process for all the planning, delivery, verification, and managing risks to critical functions performed in, or by, facilities.

**Retro-commissioning:** is a commissioning process that applies to existing buildings that were not commissioned originally. It seeks to improve how building equipment and systems function together. It often resolves problems that occurred during building design or construction, or addresses problems that have developed during the building's life. The ReCx inspection, diagnostic and repair process ensures building equipment and systems are operating optimally to meet current occupant needs.

**Water efficiency** - the protection, development, and efficient management of water resources for beneficial purposes

**Whole Building Design:** The integration of a building's systems to maximize environmental and financial functioning by considering energy systems, building materials, design methods, site preservation, and indoor air quality so that a structure can run at its maximum efficiency. An integrated project team is used to consider all aspects of the whole building design.

**Wind energy** - energy available from the movement of the wind across a landscape caused by the heating of the atmosphere, earth, and oceans by the sun.